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Helminth parasites of black-grouse (*Lyrurus tetrix* L.)
and capercaillie (*Tetrao urogallus* L.)

Robaki pasożytnicze cietrzewia (*Lyrurus tetrix* L.) i głuszca
(*Tetrao urogallus* L.)

The parasitic helminths of wild *Galliformes* were really hitherto in Poland not a subject of any elaboration. There is only one work (Bezubik, 1959) dealing with the helminthofauna of the partridge and the earlier work of the Polish authoress (Gąsowska, 1931)* cannot be taken into consideration, because the helminthological material elaborated by her was collected from the environs of Kiev (U.S.S.R.).

To fill up the gap I examined in 1956—1959 (mainly in April and May, that is during the months of permitted hunting) 87 black-grouses (*Lyrurus tetrix* L.) and 18 capercaillies (*Tetrao urogallus* L.). Because most commonly I did not get the whole bird but only its internal organs therefore I examined always the whole alimentary tract with its glands (liver, pancreas) and the whole respiratory tract. The remaining systems of organs (urogenital and circulatory systems, body cavity, subcutaneous tissue) were examined only sporadically. The material originated mainly from the Lublin Palatinate (75 black-grouses and 12 capercaillies), partly from the Białystok Palatinate (7 black-grouses and 1 capercaillie) and the Kielce Palatinate (5 black-grouses).

I should like to stress that I did not notice any differences in the sets of species of the helminths depending on the palatinates from which they originated.

* Gąsowska found in the examined black grouses and capercaillies only one species of parasite: *Raillietina urogalli* (Modeer, 1790) Fuhrmann, 1920.

All parasites described in the present work were collected from the intestine; no helminths were found in the other organs or tissues.

Preservation, staining and clarifying of the material followed the generally known methods. Thick nematodes (*Ascaridia compar* and *Heterakis gallinae*) were placed in an aqueous solution of hydrochloric acid (1:1) and after a partial digestion of the cuticle and muscles I mounted glycerin preparations. Such a procedure secured that the internal elements were very well visible, particularly the spicules.

Both the black-grouses and capercaillies, in spite of the fact that their food constitute mainly green shoots of plants, seeds, berries, buds of shrubs and trees, acorns (only young birds take mainly insects as food) are strongly invaded by helminths, as the extensity of the invasion of the first mentioned birds amounts to 93%, that of the second — 72% (Table I). The intensity of invasion, however, is relatively low and fluctuates within the limit of one to over about 30 specimens; only the number of *Ascaridia compar* reached in some black-grouses over 100 specimens.

Table I

Extensity of invasion of *Lyrurus tetrix* L. and *Tetrao urogallus* L.

Host	Examined		Invaded		%		<i>Raillietina urogalli</i>		%		<i>Raillietina cesticillus</i>		%		<i>Ascaridia compar</i>		%		<i>Heterakis gallinae</i>		%		<i>Capillaria caudinflata</i>		%	
<i>Lyrurus tetrix</i> L.	87	81	93	34	39	17	19.5	77	88	5	6	3	3													
<i>Tetrao urogallus</i> L.	18	13	72	2	10	—	—	12	68	1	6	—	—													
Total	105	94	90	36	34	17	19.5	89	85	6	6	3	3													

As shown in the table I in the examined black-grouses and capercaillies were found exclusively tapeworms (*Raillietina urogalli* and *R. cesticillus*) and nematodes (*Ascaridia compar*, *Heterakis gallinae* and *Capillaria caudinflata*). Intermediate hosts of *Raillietina cesticillus* are insects of the order *Coleoptera*; they are eaten, as already mentioned, almost exclusively by young

birds. No wonder that in the adult black grouses and capercaillies examined by me I found exclusively large forms of this parasite and there was a complete lack of young forms. The development of *R. urogalli* remains hitherto unknown. Most probably it is similar to the development of *R. cesticillus*. It is easy to understand the high degree of invasion with *Ascaridia compar* (88% of black-grouses and 68% of capercaillies), because this nematode is characterized by a simple development. However, interesting is the low degree of invasion (in spite of the simple development) with *Heterakis gallinae* (6% of black-grouses and 6% of capercaillies) as compared with the partridge (15% — Bezubik, 1959). Explained can be the low degree of invasion with *Capillaria caudinflata* (3% of black-grouses and no invasion recorded in the capercaillie), because earth worms (the intermediate hosts of this nematode) rather do not constitute the food of the examined birds.

Faunistic part

CESTOIDEA

Davaineidae Fuhrmann, 1907

Raillietina urogalli (Modeer, 1790) Fuhrmann, 1920

Synonyms: *Taenia urogalli* Modeer, 1790, *Taenia calva* Baird, 1853; *Davainea urogalli* Blanchard, 1891; *Raillietina* (*Paroniella*) *urogalli* Fuhrmann, 1920.

Hitherto found exclusively in wild *Galliformes*.

Habitat: intestine.

Geographical distribution: Europe, Asia. In Poland recorded for the first time.

I found *R. urogalli* in the intestine of 34 (39%) *Lyrurus tetrix* and in 2 (10%) *T. urogallus*, in numbers 1—24 specimens.

Because the description of this species (though very fragmentary and based, as can be supposed, on small material) is given only in the monography of Joyeux et Baer (1936) — I am presenting the morphology of this species on the basis of 30 individuals (in parentheses the data recorded by Joyeux et Baer, 1936).

Length of the tapeworm 65—370 mm (350), greatest width 1.6—4.4 mm (3—4). Diameter of the scolex 0.26—0.35 mm

(0.25—0.27). It is provided with armed by small hooklets suckers of diameter 0.095—0.13 mm ($0.1—0.128 \times 0.07—0.088$), and a large number (according to Joyeux et Baer — 160) hooks, 0.014—0.0166 mm in length (0.014—0.016) placed on the rostellum in two rows. The neck distinctly marked. The segments contain a large number (according to Joyeux et Baer — 130) of testes, 0.046—0.083 mm in diameter, arranged mainly in the lateral parts and partly in the posterior part of the segment. The pear-shaped cirrus pouch $0.1—0.12 \times 0.05—0.06$ mm in size (0.11—0.12), reaches in young segments at the most the poral excretory canals and in older segments at the most half the distance between the rim of the segment and the excretory canal; it opens more or less at the $1/3$ lateral rim of the segment; genital pores placed unilaterally. The lobate ovary is located nearer the poral rim of the segment, attains 0.3—0.4 mm in size (in the sagittal line of the segment) $\times$ 0.35—0.6 mm (in the transversal line of the segment). The vitellaria are spherical, 0.12—0.18 mm in diameter. The eggs attain dimensions $0.059—0.083 \times 0.024—0.036$ mm, the oncosphere 0.024—0.036 mm (0.024—0.030); embryonic hooks of the oncosphere were not observed.

Development: unknown; most probably similar to that of *R. cesticillus*, in which the intermediate hosts are insects of the order *Coleoptera*.

Raillietina cesticillus (Molin, 1858) Fuhrmann, 1920

Synonyms: *Taenia infundibuliformis* Duj., 1845, nec Goeze, 1782; *Taenia cesticillus* Molin, 1858; *Davainea cesticillus* Blanchard, 1891; *Cysticercus taeniae-cesticillus* Dolley, 1894; *Raillietina* (*Skrjabinia*) *cesticillus* Fuhrmann, 1920; *Brumptiella cesticillus* Lopez-Neyra, 1931.

Hitherto recorded in domestic and wild *Galliformes*.

Habitat: intestine.

Geographical distribution: cosmopolitan. In Poland recorded for the first time by Kowalewski (1902), next by Wadowski (1938) in *Gallus gallus domesticus*.

In my material *R. cesticillus* was found in 17 (19.5%) *L. tetrrix*, 1—50 specimens.

The enclosed below Table II shows the morphological data, based on measurements of 15 individuals of *R. cesticillus*. I am

doing this because the majority of monographies cite usually the same data, sometimes very seriously different from my dimensions.

A characteristic feature of this species is the lack of the collum, irregular alteration of the genital pores located in the 1/3 lateral rim of the segment, and the fact that the individual segments are very loosely connected together and the strobila disrupt very easily into fragments. Hence it is difficult to determine the total length of the tapeworm; the larger fragments in my material were 75 mm in length.

Development: insects of the order *Coleoptera* are intermediate hosts.

Table II

Comparison of measurements of *Railletina cesticillus* after various authors (in mm)

Measurements	Sprehn (1932)	Joyeux et Baer (1936)	Neveu-Le- maire (1936)	Wardle et McLeod (1952)	Bezubik
Length	130	100—130	9.45—130	9—130	30—75
Width	1.5—3.0	1.5—3.0	1.5—3.0	1.5—3.0	1.7—2.5
Scolex	0.3—0.6	0.3—0.6	0.3—0.6	0.3—0.6	0.24—0.39 0.33—0.39
Number of hooks	400—500	400—500	400—500	400—500	—
Length of hooks	7—12 μ	8—10 μ	7—12 μ	7—12 μ	10 μ
$\emptyset$ of suckers	—	0.1	—	—	0.1—0.12
$\emptyset$ of rostellum	—	0.13—0.32	—	—	0.12—0.19
Number of testes	20—30	20—30	18—30	18—30	—
$\emptyset$ of testes	—	—	0.025—0.040	—	0.055—0.075
Cirrus pouch	0.12—0.15	0.12—0.16 0.05—0.06	0.12—0.15	0.12—0.15	0.10—0.12 0.07—0.09
Cirrus	—	—	—	—	0.12 $\times$ 0.13
Egg pouches	75—88 μ	50—70 μ	70—85 μ	70—85 μ	—
Eggs	—	—	36—42 μ	—	40—53 μ
Oncospheres	—	32—35 μ	32—35 μ	—	28—37 μ
Embryonal hooks	—	—	16—23 μ	—	17—24 μ

NEMATODA

Ascaridiidae Skrjabin et Mosgovoy, 1953*Ascaridia compar* (Schränk, 1790) Travassos, 1913

Synonyms; *Ascaris compar* Schränk, 1790; *Heterakis compar* Stossich, 1887; *Ascaris lagopodis* Froelich, 1802.

Hitherto recorded in wild *Galliformes* and in *Gallus gallus domesticus*.

Habitat: intestine.

Geographical distribution: cosmopolitan. In Poland recorded by Bezubik (1959) in *Perdix perdix*.

In my material *A. compar* was found in 77 (88%) *Lyrurus tetrix* and in 12 (68%) *Tetrao urogallus*, 1 — 120 specimens.

Having to my disposition a large material I was able to collect very precise morphological data, concerning this nematode so common in black-grouses and capercaillies. I am presenting them in a comparative arrangement (Table III) together with the data of other authors*.

Development: simple.

Heterakidae Railliet et Henry, 1914*Heterakis gallinae* (Gmelin, 1790)

Synonyms: *Ascaris gallinae* Gmelin, 1790; *Ascaris vesicularis* Froelich, 1791 ex parte; *Heterakis vesicularis* Duj., 1845; *Heterakis papillosa* Railliet, 1885 nec *Ascaris papillosa* Bloch, 1782.

A widely distributed species in many representatives of the orders *Galliformes*, *Anseriformes* and *Passeriformes*.

Habitat: caecum.

Geographical distribution: cosmopolitan. In Poland often recorded.

In my material *H. gallinae* was found in 5 (6%) *Lyrurus tetrix* and in 1 (6%) *Tetrao urogallus*, 1 — 6 specimens.

Development: simple.

* Cram in her monography „Bird Parasites of the Nematode Suborders *Strongylata*, *Ascaridata* and *Spirurata*”, Washington, 1927, cites on the page 88 in the general morphological description of *A. compar*: „Oesophagus 1/14 of total length”. I suppose that this dimension may refer only to the length of the oesophagus in males, because females are not provided with such a long oesophagus (after calculation: 6.0 — 6.86 mm).

Table III

Comparison of measurements of *Ascaridia compar* after various authors (in mm)

Measurements	Cram (1927)	Huuns (1928)	Sprehn (1932)	Neveu-Le- maire (1936)	Bezubik
Male: Length	36—48	30—40	36—48	36—48	17—53
Width		1.2	1.2	—	0.8—1.46
Oesophagus	$\frac{1}{14} =$ 2.5—3.4	—	—	—	1.5—2.56
Sukcer	0.34×0.3			0.34×0.3	0.29—0.37 0.24—0.34
No. of pa- pillae	2+2+5	2+2+5	—	2+2+5	2+2+5
Tail	$\frac{1}{66.3} =$ 0.54—0.72	—	$\frac{1}{66.3} =$ 0.54—0.72	—	0.42—0.61
Spicules	—	$\frac{1}{10} =$ 3.0—4.0	1.78	1.8	1.9—3.95
Female: Length	84—96	50—80	84—96	84—96	34—80
Width	—	1.6	1.6	—	1.34—1.95
Oesophagus	$\frac{1}{14} =$ 6.0—6.86	—	—	—	2.32—3.0
Length of eggs	0.08—0.091	0.1—0.11	0.091	0.08—0.091	0.083—0.103
Width of eggs	0.057—0.06	0.065	0.057	0.057—0.06	0.056—0.066

Capillariidae Neveu-Lemaire, 1936*Capillaria caudinflata* (Molin, 1858) Travassos, 1915

Synonyms: *Trichosoma longicolle* Mehlis, 1831; nec Rudolphi, 1819; *Thominx longicollis* (Mehlis, 1831); *Colodium caudinflatum* Molin, 1858; *Trichosomum caudinflatum* (Molin, 1858); *Trichosoma gallinum* Kowalewski, 1894; *Trichosomum papillosum* Blome, 1909; *Thominx papillosum* (Blome, 1909); *Trichosomum papilligera* Railliet et Henry, 1911; *Capillaria blomeri* Travassos, 1915; *Capillaria gallina* (Goeze, 1782); *Capillaria columbae* var. *sturni* Cannon, 1939; *Capillaria* (*Thominx*) *caudinflata* Vavilova, 1926; *Capillaria longicollis* Madsen, 1945.

Parasite of domestic and wild *Galliformes* and *Columbiformes*; sometimes recorded also in *Anseriformes* and *Passeriformes*.

Habitat: intestine.

Geographical distribution: cosmopolitan. In Poland recorded hitherto by Kowalewski (1894, 1902) and by Bezubik (1959).

I found *C. caudinflata* in 3 (3%) *Lyrurus tetrix*, 1—4 specimens. It is then a more rare parasite of the black-grouses than of partridges (16% of invasion — Bezubik, 1959). Precise dimensions of this nematode, collected from the partridge, are presented in another paper (Bezubik, 1959). The material from the black-grouse did not differ in any way from the material from the partridge.

Development: earth-worms are the intermediate hosts: *Allolobofora caliginosa*, *Eisenia foetida* and *Lumbricus terrestris*.

Conclusions

1. In the total number of 87 black-grouses and 18 capercaillies examined, 81 black grouses (93%) and 13 capercaillies (72%) proved to be invaded with parasitic helminths. This is a very serious invasion, considering that these birds take food mainly of plant origin.

2. The intensity of invasion is relatively low, because it fluctuates usually within the limits of several to over about 30 specimens of parasites. Only the invasion of *Ascaridia compar* is very great because reaches 120 specimens in one bird.

3. By one species of parasites were invaded 36 (41%) black-grouses and 11 (61%) capercaillies, by two species — 36 (41%) black-grouses and 2 (11%) capercaillies, by three species — 8 (9%) black-grouses, and by four species — 1 (1%) black-grouse. Free of parasites were 6 (7%) black-grouses and 5 (28%) capercaillies.

4. On the dependence of the composition of the helminthofauna on the kind of food taken proves the absence in the examined material of trematodes and thorny-headed worms, the intermediate hosts of which are not eaten by the black-grouses and capercaillies. There occur, however, parasites of a simple development (*Ascaridia compar*, *Heterakis gallinae*), or such, of which the intermediate hosts are insects that constitute at least in some periods of life additional food to black-grouses and capercaillies (*Raillietina cesticiillus*, *R. urogalli*). The very rare occurrence of *Capillaria caudinflata* (only in black grouses) may be explained by the fact that the

examined birds take exceptionally as their food earth-worms, the intermediate hosts of this nematode.

5. Four of the five species of parasites found in the material (*Raillietina cesticillus*, *Ascaridia compar*, *Heterakis gallinae* and *Capillaria caudinflata*) occur also in domestic birds; black-grouses and capercaillies can, therefore, be a factor of invasion for the domestic *Galliformes*.

6. *Raillietina urogalli* is recorded in Poland for the first time.

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LITERATURE

1. Bezubik B. — Helminthofauna of partridge (*Perdix perdix* L.) in the Lublin Palatinate. *Acta Parasit. Polon.*, 7, 9, 1959.
2. Cram E. B. — Bird parasites of the Nematode suborders *Strongylata*, *Ascaridata*, and *Spirurota*. Washington, 1927.
3. Gąsowska M. — Die Vogelcestoden aus der Umgebung von Kiew (Ukraine). *Bull. de l'Acad. Polon. d. Sc. Lettr.*, B: Sc. Nat. (II), 1931.
4. Gušanskaja L. Ch. — K gelmintofaune teterevidnych ptic Urala, Dalnego Vostoka i Sachalina. *Trudy VIGIS*, 4, 1950.
5. Gušanskaja L. Ch. — K gelmintofaune dikich kurinyh ptic SSSR. *Trudy Gelm. Lab.*, 6, 1952.
6. Joyeux Ch. et Baer J. G. — Faune de France. 30. *Cestodes*. Paris, 1936.
7. Kowalewski M. — Spis robaków pasorzytnych znalezionych w ptactwie domowym, w Dublanach, w ciągu lat 1894—1901. *Przegląd Weterynarski*, 17, 1902.
8. Mosgovoy A. A. — Askaridaty životnyh i čeloveka i vyzyvaemye imi zabolevanija. *Osnovy Nematodologii*, 2, 1952.
9. Neveu-Lemaire M. — *Traité d'Helminthologie médicale et vétérinaire*. Paris, 1936.
10. Skrzjabin K. I., Shikhobalova N. N., Orlov I. B. — Trichocefalidy i kapillariidy životnyh i čeloveka i vyzyvaemye imi zabolevanija. *Osnovy Nematodologii*, 6, 1957.
11. Sprehn C. — *Lehrbuch der Helminthologie*. Berlin, 1932.
12. Wadowski St. — Niektóre pasożyty jelit drobiu. *Pamiętnik P.I.N.G.W. w Puławach*, 2, 1938.
13. Wardle R. A., McLeod J. A. — *The Zoology of tapeworms*. Minnesota Press, 1952.

STRESZCZENIE

W latach 1956—1959 (głównie w kwietniu i w maju) zbadano 87 cietrzewi (*Lyrurus tetrix* L.) i 18 głuszców (*Tetrao urogallus* L.) z terenu woj. lubelskiego, częściowo białostockiego i kieleckiego. Stwierdzono 2 gatunki tasiemców: *Raillietina urogalli* (Modeer, 1790) Fuhrmann, 1920 i *R. cesticillus* (Molin, 1858) Fuhrmann, 1920, oraz 3 gatunki nicieni: *Ascaridia compar* (Schrank, 1790) Travassos, 1913, *Heterakis gallinae* (Gmelin, 1790) *Capillaria caudinflata* (Molin, 1858) Travassos, 1915.

Ekstensywność inwazji wynosi 93% dla cietrzewi i 72% dla głuszców. Intensywność inwazji jest na ogół niewielka (kilka lub kilkanaście egzemplarzy pasożyta); jedynie *Ascaridia compar* występowała liczniej, gdyż do 120 egz. w jednym ptaku.

Specyficzna dla dzikich kurowatych okazała się *Raillietina urogalli*, pozostałe gatunki były stwierdzane również u ptactwa domowego. Można więc sądzić, że cietrzewie i głuszce (podobnie zresztą jak kuropatwy — Bezubik, 1959) mogą być źródłem zarażenia dla domowych ptaków kurowatych.

Po raz pierwszy stwierdzono w Polsce tasiemca *Raillietina urogalli*.